CLAIMS

1. A method for the continuous, non-invasive measurement of blood pressure based on the principle of the unloaded arterial wall, where on at least one first and one second body part or body region, each containing an artery of identical or comparable size, there is positioned a first and a second pressure cuff of identical or comparable size with a first and a second inflatable pressure measuring chamber, the pressure in the first pressure measuring chamber being controlled in dependence of the measurement signal of a plethysmographic sensor device in such a way that the amplitude of the plethysmographic measurement signal is minimized, and a pressure measuring signal being obtained from the first pressure measurement chamber, **characterized in that** the second pressure measuring chamber is operated as a reference pressure chamber independently of the first pressure measuring chamber, and that the pressure in the reference pressure chamber is controlled in accordance with a preselectable pressure function, a reference signal being obtained simultaneously with the pressure measuring signal, and that the reference signal is used in the interpretation of the pressure measuring signal.

2. Method according to claim 1, **characterized in that** the setpoint of the pressure measuring signal is continuously monitored and/or adjusted by means of the reference signal.

3. Method according to claim 1 or 2, **characterized in that** the reference signal is measured oscillometrically in the reference pressure chamber.

4. Method according to claim 1 or 2, **characterized in that** the reference signal is measured plethysmographically in the reference pressure chamber.

5. Method according to any of claims 1 to 4, **characterized in that** the pressure in the reference pressure chamber is controlled in accordance with a repeating staircase or ramp function.

6. Method according to claim 4 or 5, **characterized in that** the pressure in the reference pressure chamber is controlled in accordance with the preselectable pressure function and simultaneously with the help of the plethysmographically obtained reference signal in such a way that the amplitude of the reference signal is minimized while a reference pressure signal is measured.

7. Method according to claim 6, **characterized in that** the reference pressure signal, measured at various preselectable pressure values of the pressure function, is analysed, compared to predetermined ideal pulse curves, and - when the deviation from a given pulse curve is at a minimum - the setpoint for the pressure measuring signal is determined therefrom.

8. Method according to any of claims 1 to 7, **characterized in that** a physiological or pathological change of the pressure measuring signal is inferred from a change of the mean pressure and/or the amplitude of the pressure measuring signal and a shift of the amplitude maximum of the reference signal or the reference pressure signal in the same direction.

9. Method according to any of claims 1 to 8, **characterized in that** a loss of setpoint of the pressure signal is

inferred from a change of the mean pressure and/or the amplitude of the pressure measuring signal and an absent or oppositely directed shift of the amplitude maximum of the reference signal or the reference pressure signal.

10. Method according to any of claims 3 to 9, **characterized in that** at preselectable time intervals or triggered by loss of setpoint the reference pressure chamber is operated as pressure measuring chamber and the pressure measuring chamber as reference pressure chamber.

11. Method according to any of claims 1 to 10, **characterized in that** the two pressure cuffs are positioned on two neighbouring arteries, preferably on two adjacent fingers of one hand.

12. A device for the continuous, non-invasive measurement of blood pressure based on the principle of the unloaded arterial wall, with at least one first (1) and one second pressure cuff (1') of identical or comparable size, which can be attached on at least one first and one second body part or body region (3, 3') containing an artery (2, 2') of identical or comparable size, each having an inflatable pressure measuring chamber (4, 4'), the first pressure cuff (1) being provided with a first plethysmographic sensor device (5) connected to a controlling and adjusting device (6), which controls the pressure in the first pressure measuring chamber (4) using the measuring signal of the plethysmographic sensor device (5), and where the pressure measuring chamber (4) is connected to a pressure sensor (7) to obtain a pressure measuring signal, **characterized in that** the pressure measuring chamber of the second pressure cuff (1') is configured as a reference pressure chamber (4'),

which is controlled simultaneously with and independently of the pressure measuring chamber (4) of the first pressure cuff, and that the pressure measuring chamber (4) of the first pressure cuff (1) and the reference pressure chamber (4') of the second pressure cuff (1') each have separate inlet valves (10, 10') and outlet valves (11, 11'), with the pressure in the reference pressure chamber (4') being controlled via the controlling and adjusting device (6) in accordance with a preselectable pressure function.

13. Device according to claim 12, **characterized in that** the second pressure cuff (1') is provided with an oscillometric sensor device.

14. Device according to claim 12, **characterized in that** the second pressure cuff (1') is provided with a second plethysmographic sensor device (5').

15. Device according to any of claims 12 to 14, **characterized in that** the separate inlet (10, 10') and outlet (11, 11') valves of the pressure measuring chamber (4) and the reference pressure chamber (4') are placed in separate pressure control chambers (12, 12'), which are each connected by separate pressure lines (13, 13') to the pressure measuring chamber (4) and the reference pressure chamber (4') and via the inlet valves (10, 10') to a common pressure source (14).

16. Device according to any of claims 12 to 15, **characterized in that** the two pressure cuffs (1, 1') are ring-shaped and are essentially rigidly connected to each other, preferably in the form of a double finger cuff.

17. Device according to any of claims 12 to 16, **characterized in that** a heating unit (21) is integrated in or appended to the two pressure cuffs (1, 1'), which is provided with at least one heating element (22, 22'), preferably a heating foil or a heating spiral.

18. Device according to claim 17, **characterized in that** the heating unit (21) has heatable appendages, for instance fingerstalls (23, 23'), extending distally towards the body periphery.

19. Device according to claim 17 or 18, **characterized in that** the heating unit (21) has appendages (24, 24') extending proximally towards the body centre, which lie for instance against the inside of the hand and against the back of the hand.

20. Device according to any of claims 17 to 19, **characterized in that** the heating unit (21) has at least one temperature sensor (20, 20') placed in one of the pressure cuffs (1, 1'), whose temperature signal is used to control the heat output of the heating unit (21).

21. Device according to any of claims 17 to 20, **characterized in that** a common tube (25) is provided, which contains pneumatic feeds and electrical lines for the two pressure cuffs (1, 1') and the heating unit (21).

22. Device according to any of claims 12 to 21, **characterized in that** at least one sensor (41, 42, 44) is provided at a location distal to the pressure measuring chamber (4) and/or the reference pressure chamber (4') for measuring a volume change of the body part (3).

23. Device according to claim 22, **characterized in that** an impedance sensor (42), strain gauges (41) and/or an additional plethysmographic sensor (44) is positioned on the body part (3), preferably at the distal end of the finger.

24. Device according to any of claims 12 to 23, **characterized in that** at least one sensor (45) for measuring blood flow, for instance an occluded-vein plethysmograph or a laser Doppler blood flow measuring device, is provided at a location distal to the pressure measuring chamber (4) and/or the reference pressure chamber (4').

25. Device according to any of claims 12 to 24, **characterized in that** at least one sensor device (46) for measuring blood gases, for instance the partial pressure of CO_2 or O_2, is provided at a location distal to the pressure measuring chamber (4) and/or the reference pressure chamber (4').

26. Device according to any of claims 12 to 25, **characterized in that** two processors (6, 6') or a multi-tasking or multi-threading processor (6, 6') are provided as control and adjusting unit.

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